EFFECT OF DIETARY SALT LEVELS ON PERFORMANCE OF FEEDLOT STEERS

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Story in Brief

One hundred nineteen crossbred yearling steers, weighing an average of 784 lb, were used to determine the effect of dietary salt levels (.5, .25 or 0%) on performance of feedlot steers. Dietary salt levels did not statistically alter rate of live gain (3.14, 3.06 and 3.16 lb/day for .5, .25 and 0% salt); carcass adjusted daily gain (3.77, 3.74 and 3.84); feed intake (20.36, 20.16 and 20.26 lb/day); or feed efficiency on either a live (6.50, 6.61 and 6.40) or carcass weight basis (5.41, 5.40 and 5.28). In addition, none of the treatments statistically altered carcass characteristics. The results of this experiment showed no effect of dietary salt concentration on animal performance.

(Key Words: Feedlot Steers, Dietary Salt Level, Lasalocid)

Introduction

Salt levels in feedlot rations typically range from 0 to 1%. Lower concentrations help to reduce accumulation in runoff from feedlots and can reduce the quantity of supplement to pellet. As ionophores exert their action through altering mineral transport, concentrations of minerals (K and Na) might be expected to alter their efficacy. Although no interaction between ionophore source (monensin vs lasalocid) and potassium level (.43 to 1% of diet dry matter) was noted in one feeding trial (Ferrell et al., 1983), mineral levels definitely alter ruminal function (Doran et al., 1986) and water intake and excretion (Ferrell et al., 1982) which may parallel or oppose effects of ionophores. Mineral levels also alter resistance of ruminal microbes to the ionophores (Dawson et al., 1985). For optimal efficacy of ionophores, the optimum or minimum levels of dietary salt need to be determined, but regardless of any mineral-ionophore interaction, the combination which produces maximum animal performance, not maximum ionophore effect should be fed.

Materials and Methods

One hundred nineteen crossbred (primarily British crosses) yearling steers which had been wintered on wheat pasture near Dalhart, Texas were trucked to Goodwell, Oklahoma on June 3, 1987. On arrival, all cattle were weighed individually, ear tagged, implanted with Synovex-S and injected with ivermectin and a BRSV vaccine. The steers were divided into five weight groups of 24 head each (3 pens of 8 steers). Treatments were randomly assigned to pens within each block. The dietary treatments were 0.5%, 0.25% and 0% supplemental salt.

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Table 1. Diet composition, dry matter basis.[a]

Ingredient	Ration Sequence 1	2	3	4[a]
Corn, cracked	52.70	62.28	71.87	80.02
Chopped alfalfa	38.36	28.78	19.19	11.04
Cane molasses	3.88	3.88	3.88	3.88
Pelleted supplement[b]	5.06	5.06	5.06	5.06

[a]To provide 12.25% protein, .53% calcium, .78% potassium, .33% phosphorus, 94.7 mcal NEm/cwt, 61.1 mcal NEg/cwt and .5% salt, .25% salt or 0% salt.
[b]Provided 30 g lasalocid/ton of total feed.

Steers were fed a high concentrate cracked corn ration twice daily (0700 and 1600) for the 95 day trial (Table 1). Chopped alfalfa hay was used to dilute the ration to 60 percent concentrate to start the cattle on feed. Roughage content of the diet was decreased sequentially in three steps until the cattle were on their final ration by 28 days on feed.

Cattle weights were off truck weights (shrunk) at the start of the trial but were taken on full-feed on days 28, 56, 84 and 95.
For calculation purposes, all full weights were reduced by 4% to compensate for digestive tract fill. Steers were trucked to Holcomb, Kansas on day 97 of the trial (September 9, 1987) for slaughter, and carcass data were obtained. This trial was analyzed as a randomized complete block design with five replications per treatment. Statistical comparisons included linear and quadratic contrasts.

Results and Discussion

Effects of dietary salt concentration on cattle performance and carcass characteristics are presented in Tables 2 and 3. No effects of dietary salt concentration were statistically significant. Carcass adjusted daily gains and feed efficiency were about 2% greater with no added dietary salt than with .5 or .25% dietary salt. Similarly, Roth et al. (1970) noted no difference in performance of feedlot steers and heifers fed either 0 or .5% dietary salt in an 84-day Kansas trial. Salt is necessary in the diet for finishing steers primarily as a source of sodium, but the amount needed is low enough to be met by sodium in feed and water. Further, animals can be maintained on low sodium diets for some time because of their efficient conservation mechanisms (NRC, 1984). Thus, it may take several months for a sodium deficiency to occur.

Before completely deleting supplemental salt from a feedlot diet one must consider other potential health effects. The incidence of bloat in pastured cattle appears to be increased when dietary sodium is low relative to potassium. Because a sodium deficiency reduces salivary flow, it may eventually reduce feed intake and reduce ruminal buffering and osmolarity, as well, which may increase the incidence of ruminal dysfunction.

Table 2. Effect of dietary salt levels on steer performance.

Item	0.5% Salt	0.25% Salt	0% Salt
No. of steers	40	39	40
No. of pens	5	5	5
Weight, lb:			
Initial	788	782	782
56 days	1023	1007	1022
95 days	1131	1117	1128
Daily gains, lb:			
0-56	3.53	3.31	3.55
57-95	2.58	2.71	2.61
0-95	3.14	3.06	3.16
0-97[a]	3.77	3.74	3.84
Daily feed, lb DM:			
0-56	20.57	20.47	20.47
57-95	20.06	19.72	19.96
0-95	20.36	20.16	20.26
Feed/gain:			
0-56	5.82	6.22	5.79
57-95	7.94	7.36	7.68
0-95	6.50	6.61	6.40
0-97[a]	5.41	5.40	5.28
Metabolizable energy, mcal/kg	2.97	2.94	2.99
Net energy, mcal/cwt			
Maintenance	87.8	86.4	88.5
Gain	58.5	57.6	58.9

[a]Based on carcass weight divided by .62, an assumed dressing percent.

Table 3. Effect of dietary salt level on carcass characteristics.

Item	0.5% Salt	0.25% Salt	0% Salt
Carcass wt, lb	715	709	716
Dressing %	65.9	66.2	66.1
Rib eye area, sq in	12.8	12.7	13.2
KHP, %	2.55	2.40	2.42
Fat thickness, in	.54	.47	.58
Marbling score[a]	13.45	13.28	13.05
Percent choice	85.0	76.4	77.1
Percent YG 4	7.5	2.5	10.7
USDA Yield Grade	2.97	2.79	2.91
Cutability, %	49.9	50.3	50.0
Liver abscesses:			
Incidence, %	22.5	18.2	17.9
Severity[b]	2.63	2.25	2.13

[a]12=slight plus, 13=small minus
[b]0=no abscesses; 1=one or two small, well organized inactive abscesses; 2=two to four well organized abscesses without inflammation; 3=one or more active abscesses with inflammation, only among cattle with abscesses.

Literature Cited

Dawson, K.A. et al. 1985. Some physiological characteristics of isolated rumen bacteria after adaptation to increased concentrations of monensin. J. Anim. Sci. 61(Suppl. 1):491.

Doran, B.E. et al. 1986. Effect of supplemental potassium and monensin on ruminal digestion and passage rates. Okla. Agr. Exp. Sta. Res. Rep. MP-118:131.

Ferrell, M.C. et al. 1982. Ionophores and digestibility of feedlot rations. Okla. Agr. Exp. Sta. Res. Rep. MP-112:220.

Ferrell, M.C. et al. 1983. Potassium levels and ionophores for feedlot steers. Okla. Agr. Exp. Sta. Res. Rep. MP-114:54.

National Research Council. 1984. Nutrient Requirements of Beef Cattle, 6th rev. ed. Washington, D.C. National Academy Press.

Roth, G.M. et al. 1970. Protein, salt, and premix aspects of all-concentrate cattle finishing rations. Kansas State Univ., Cattlemen's Day 536:19.